

Grade

8

meapTM
Michigan Educational Assessment Program

Item Descriptors



Revised 1/13/14

SCIENCE
FALL 2013

MICHIGAN STATE BOARD OF EDUCATION**STATEMENT OF ASSURANCE OF COMPLIANCE WITH FEDERAL LAW**

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NOTE: For each item listed throughout this booklet, the first statement is the Michigan Science Curriculum Framework (MSCF) benchmark and the second statement is the descriptor for the item's stem or question. Note that some items only occur in certain forms as indicated by the form numbers in parenthesis after the item numbers (i.e., F1=Form 1, F2=Form 2, etc.).

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Students were instructed to read the directions below silently as the test administrator read them aloud.

PART 1

DIRECTIONS:

In this part, you will answer multiple-choice science questions. Some questions will ask you to read a passage, table, or other science-related information. Use that information with what you know to answer the question.

You must mark all of your answers in Part 1 of your **Answer Document** with a No. 2 pencil. You may underline, circle, or write in this test booklet to help you, but nothing marked in this test booklet will be scored. No additional paper may be used.

Mark only one answer for each question. Completely fill in the corresponding circle on your **Answer Document**. If you erase an answer, be sure to erase completely. Remember that if you skip a question in the test booklet, you need to skip the answer space for that question on the **Answer Document**. If you are not sure of an answer, mark your **best** choice.

A sample question is provided for you below.

Sample Multiple-Choice Question:

Pill bugs can often be found underneath rocks and rotting logs. When exposed to light, they immediately try to find a dark place to hide. This reaction by the pill bugs is a result of

- A** migration.
- B** feeding behavior.
- C** energy requirements.
- D** changing environmental conditions.

For this sample question, the correct answer is **D**. Circle **D** is filled in for the sample question on your **Answer Document**.

Once you have reached the word **STOP** in your test booklet, do **NOT** go on to the next page. If you finish early, you may go back and check your work in Part 1 of the test **ONLY**. Check to make sure that you have answered every question. Do **NOT** look at any other part of the test.

NOTE: The directions for Part 2 are the same as the above instructions.

- 1 L.OL.05.42:** Explain how animal systems (digestive, circulatory, respiratory, skeletal, muscular, nervous, excretory, and reproductive) work together to perform selected activities.

Given four statements regarding how two specified body systems work together, recognize the statement that best describes the interaction between the two named body systems after a specified activity.

- A** correct, described the interaction of the two body systems post the specified activity
- B** one of the two body systems was misidentified
- C** selected an incorrect statement about body system physiology
- D** one of the two body systems was misidentified

- 2 (F1) L.EC.06.41:** Describe how human beings are part of the ecosystem of the Earth and that human activity can purposefully, or accidentally, alter the balance in ecosystems.

Based on the information provided, recognize the effect of a non-native plant on a Michigan ecosystem.

- A** correctly recognized the effect of the non-native plant on the ecosystem
- B** selected the opposite effect based on the description of the non-native plant's effect
- C** selected a correct effect on native plants but incorrect effect on native animals
- D** selected an incorrect effect on native plants but correct effect on native animals

- 2 (F2) L.EC.06.21:** Describe common patterns of relationships between and among populations (competition, parasitism, symbiosis, predator/prey).

Recognize how a change in population size of a specified organism in an ecosystem can subsequently change the population size of another organism in the ecosystem.

- A** correctly identified the change in population size of the specified organism but incorrectly selected the effect on the other populations in the ecosystem
- B** correctly identified the change in population size of the specified organism but incorrectly selected the effect on the other populations in the ecosystem
- C** correctly recognized the effect on the specified organism population and correctly identified the effect on other organism populations
- D** correctly identified the change in population size of the specified organism but incorrectly selected the effect on the other populations in the ecosystem

- 2 (F3) L.EC.06.42:** Predict possible consequences of overpopulation of organisms, including humans, (for example: species extinction, resource depletion, climate change, pollution).

Recognize the most likely consequence due to a rapid increase of a specified population in a relatively closed ecosystem.

- A** selected a consequence unlikely to happen and not related to the effects due to a population increase
- B** selected a consequence that is the opposite of what would happen
- C** selected a consequence based on erroneous reasoning for the consequence
- D** correct, selected the consequence noting the change resulting from the increase in the specified population

- 2 (F4) L.EC.06.31:** Identify the living (biotic) and nonliving (abiotic) components of an ecosystem.

Given ten separate ecosystem components, arranged in four sets of three components each, recognize the set that is abiotic

- A** selected a set that had one biotic component
- B** selected a set having two biotic components
- C** correct, selected the set having all abiotic components
- D** selected a set having two biotic components

- 2 (F5) L.EC.06.32:** Identify the factors in an ecosystem that influence changes in population size.

Recognize examples of ecosystem factors that could influence population size for a familiar organism.

- A** did not identify the example factor that would have the least influence on the population size of the organism
- B** did not identify the example factor that would have the least influence on the population size of the organism
- C** did not identify the example factor that would have the least influence on the population size of the organism
- D** correctly identified the example factor that would have the least influence on the population size of the organism

- 3 L.OL.05.41:** Identify the general purpose of selected animal systems (digestive, circulatory, respiratory, skeletal, muscular, nervous, excretory, and reproductive).

Given four pairs of animal body systems, recognize the pair that serves a specified purpose for a familiar animal.

- A** selected a pair where one system is not directly involved with the specified process
- B** selected a pair where one system is not directly involved with the specified process
- C** selected the correct pair of body systems where both are directly involved with the specified process
- D** selected a pair where neither system is directly involved with the specified process

- 4 (F1) L.EV.05.14:** Analyze the relationship of environmental change and catastrophic events (for example: volcanic eruption, floods, asteroid impacts, tsunamis) to species extinction.

Describe an impact of a catastrophic event on a local population.

- A** incorrect, selected an unlikely impact
- B** correct, described a likely impact of a catastrophic event
- C** incorrect, selected an unlikely impact
- D** incorrect, selected an unlikely impact

- 4 (F2) L.EV.05.21:** Relate degree of similarity in anatomical features to the classification of contemporary organisms.

Given four separate statements regarding applicable scientific methods, recognize the statement that provides the most reasonable basis for studying evolutionary relationships among different organisms.

- A** selected a statement that implies studying existing conditions, not changing conditions
- B** selected a statement that pertains to each specific organism's life characteristics
- C** correct, selected the statement that promotes comparison among organisms regarding their anatomic features
- D** selected a statement that pertains to each specific organism's life characteristics

- 4 (F3) L.EV.05.13:** Describe how fossils provide evidence about how living things and environmental conditions have changed.

Understand the use of fossil evidence as basis for scientific concepts (e.g., hypotheses, conclusions).

- A** selected a scientific concepts that is not based on the specified fossil evidence
- B** selected a scientific concept that is not supported by the limited location of the fossil evidence or further statement regarding the time period of fossil life
- C** recognized the best scientific concept based on the specified fossil evidence
- D** selected a scientific concept not support with time period evidence

- 4 (F4) L.EV.05.14:** Analyze the relationship of environmental change and catastrophic events (for example: volcanic eruption, floods, asteroid impacts, tsunami) to species extinction.

Understand the environmental consequences from a specified catastrophic event on Earth's surface.

- A** selected a post event consequence that does not occur due to the specified catastrophic event
- B** selected the environmental consequence attributed to the specified catastrophic event that can globally threaten life on Earth
- C** selected local damage from the catastrophic event that, by itself, does not have a global impact on the environment as another more serious life-threatening consequence attributed to the specified event
- D** selected local damage from the catastrophic event that, by itself, does not have a global impact on the environment as another more serious life-threatening consequence attributed to the specified event

- 4 (F5) L.EV.05.21:** Relate degree of similarity in anatomical features to the classification of contemporary organisms.

Using a defined system of scientific classification, recognize which set of three organisms satisfies the specific classification.

- A** selected a set where one of the three organisms did not satisfy the classification definition
- B** selected a set where one of the three organisms did not satisfy the classification definition
- C** recognized the set where all three organisms satisfied the classification definition
- D** selected a set where one of the three organisms did not satisfy the classification definition

- 5 L.OL.07.62:** Explain that carbon dioxide and water are used to produce carbohydrates, proteins, and fats.

Recognize the resource that provides energy for animals.

- A** selected a substance that does not provide energy for animals
- B** correctly identified the substance that provides energy for animals
- C** selected a substance that does not provide energy for animals
- D** selected a substance that does not provide energy for animals

- 6 L.EV.05.12:** Describe the physical characteristics (traits) of organisms that help them survive in their environment.

Given an environmental condition, select the physical characteristic of an animal most useful for its survival in this environment.

- A** recognized the physical characteristic and function used to enable survival under the specific environmental condition.
- B** selected a physical characteristic with a compromised survival function under the given environmental conditions
- C** selected a physical characteristic with a compromised survival function under the given environmental conditions
- D** selected a physical condition that has no utility for survival under the specified environmental conditions

- 7 (F1) L.HE.05.12:** Distinguish between inherited and acquired traits.

Recognize whether and how a specified and familiar human trait is acquired or inherited.

- A** incorrect, selected the wrong process by which an organism exhibits the specified trait
- B** correct, selected the process by which an organism exhibits the specified trait
- C** incorrect, selected a genetic process not applicable for how an organism exhibits the specified trait
- D** incorrect, selected a genetic process not applicable for how an organism exhibits the specified trait

- 7 (F2) L.HE.05.11:** Explain that the traits of an individual are influenced by both the environment and the genetics of the individual.

Given a specified example of a human behavior, determine the extent to which the behavior has a genetic basis.

- A** correctly recognized that the specified behavior is directly associated with genetic coding
- B** incorrectly selected a concept that the behavior is acquired via experience
- C** incorrectly selected a concept that the behavior is acquired in respect to the genetic basis of another body part
- D** incorrectly selected the concept that the specified behavior is based on chromosomes and not genes

- 7 (F3) L.HE.07.21:** Compare how characteristics of living things are passed on through generations, both asexually and sexually.

For a specified multicellular organism that reproduces asexually, recognize the statement that best describes the genetics of the offspring.

- A** selected the correct description of the genetic composition of the offspring
- B** selected an incorrect description of the genetic component of the offspring
- C** selected an incorrect description of the genetic component of the offspring
- D** selected an incorrect description of the genetic component of the offspring

- 7 (F4) L.HE.05.12:** Distinguish between inherited and acquired traits.

Recognize the occurrence of an observable acquired trait.

- A** incorrectly attributed the occurrence of the acquired trait to genetics
- B** correctly attributed the acquired trait of an organism to its cause
- C** selected an incorrect fact about the part of the organism observed and an unsupported cause for the acquired trait of the organism part
- D** selected an incorrect fact about the part of the organism observed and an unsupported cause for the acquired trait of the organism part

- 7 (F5) L.HE.05.11:** Explain that the traits of an individual are influenced by both the environment and the genetics of the individual.

Recognize the genetic basis of an organism's observable characteristics.

- A** attributed the observed characteristic of the organism as an acquired trait having an environmental source
- B** correctly identified that the basis for an observed organism characteristic is primarily genetic
- C** attributed the observed characteristic of the organism as an acquired trait having an environmental source
- D** attributed the observed characteristic of the organism as an acquired trait having an environmental source

- 8 S.IA.07.12:** Evaluate data, claims, and personal knowledge through collaborative science discourse.

Select a valid process for evaluating data based on scientific investigations.

- A** incorrect, selected a process that does not consider external peer participation for evaluation
- B** incorrect, selected a process that does not consider external peer participation for evaluation
- C** correct, selected an action that can validate observations made during an investigation utilizing peer review
- D** incorrect, selected a process that does not consider external peer participation for evaluation

- 9 (F1) S.IP.07.14:** Use metric measurement devices in an investigation.

Recognize the appropriate metric unit used for the given investigation procedure using a metric device.

- A** incorrect, selected a metric unit used with a different metric device
- B** incorrect, selected a metric unit used with a different metric device
- C** correct, selected a metric unit used with the given metric device
- D** incorrect, selected a metric unit used with a different metric device

- 9 (F2) S.IP.07.12:** Design and conduct scientific investigations.

Identify the intent of an investigation based on the specified steps used to conduct the investigation.

- A** misinterpreted the intent of the investigation
- B** misinterpreted the intent of the investigation
- C** misinterpreted the intent of the investigation
- D** correctly recognized the intent of the investigation

- 9 (F3) S.IP.07.11:** Generate scientific questions based on observations, investigations, and research.

Identify a question based on the given information to further a scientific investigation.

- A** incorrect, selected a question that would not be answered by a scientific investigation
- B** incorrect, selected a question based on opinion that cannot be scientifically investigated
- C** incorrect, selected a historical question rather than an investigative question
- D** correct, selected a question to help further understand the investigation and can be scientifically tested

- 9 (F4) S.IP.07.14:** Use metric measurement devices in an investigation.

Select the inappropriate metric measure for a measurement task using a data table.

- A** selected an appropriate metric measure
- B** correctly identified the metric measure that underestimated the results of the measurement task
- C** selected an appropriate metric measure
- D** selected an appropriate metric measure

9 (F5) S.IP.07.12: Design and conduct scientific investigations.

Review a planned research-investigation design and recognize the additional research activity intended to improve the reliability of the investigation results.

- A** selected an activity that would just add a different treatment trial, an activity that does not improve reliability
- B** correctly selected the activity that should improve reliability by repeating treatment trials to obtain multiple measures
- C** selected an activity that just summarizes a measured variable, an activity that does not improve reliability
- D** selected an activity that just summarizes treatment and measured variables, an activity that does not improve reliability

10 (F1) S.RS.07.18: Describe what science and technology can and cannot reasonably contribute to society.

Given a brief description of a specified compound, identify, from the list of conclusions about the compound, the non-scientific conclusion.

- A** selected a scientific conclusion
- B** correct, selected the non-scientific conclusion
- C** selected a scientific conclusion
- D** selected a scientific conclusion

10 (F2) S.RS.07.15: Demonstrate scientific concepts through various illustrations, performances, models, exhibits, and activities.

Identify how changing certain variables in an investigation can impact the results.

- A** correct, described an action that would change the type of materials in the investigation and impact the results
- B** incorrect, described an action that would not likely change the results
- C** incorrect, described an action that would not likely effect the results
- D** incorrect, described an action that would not likely affect the results

10 (F3) S.RS.07.11: Evaluate the strengths and weaknesses of claims, arguments, and data.

Evaluate sources of evidence and select which evidence type provides least support for the specified conclusion.

- A** this evidence would provide objective data to support the conclusion
- B** this type of evidence would least support the conclusion in that it is not completely objective or impartial from its source
- C** this evidence would provide objective data to support the conclusion
- D** this evidence would provide objective data to support the conclusion

- 10 (F4) S.RS.07.15:** Demonstrate scientific concepts through various illustrations, performances, models, exhibits, and activities.

Given a pictorial display of a scientific concept, identify the type of scientific information presented.

- A** the illustration did not provide information of a controlled empirical investigation
- B** the illustration displayed specific fact, it did not provide a general explanation of scientific order
- C** the illustration was used to display a specific matter change process which can not be visualized
- D** the illustration did not present an empirical classification or measure

- 10 (F5) S.RS.07.13:** Identify the need for evidence in making scientific decisions.

Recognize the purpose of the evidence (i.e., results) gathered in a scientific investigation.

- A** incorrectly selected the concept that scientific evidence is absolute and definitive
- B** selected a concept that implies evidence must be interpreted based on existing frames of reference
- C** selected a concept that implies that evidence must be collected through a process not shared by other researchers
- D** correctly recognized the purpose of evidence gathered through scientific investigation

- 11 P.PM.07.24:** Describe examples of physical and chemical properties of elements and compounds (boiling point, density, color, conductivity, reactivity).

Distinguish between conductors and nonconductors.

- A** incorrectly selected a conductor as a nonconductor
- B** incorrectly selected a conductor as a nonconductor
- C** incorrectly selected a conductor as a nonconductor
- D** correctly identified the nonconductor material

- 12 (F1) P.PM.07.22:** Describe how the elements within the Periodic Table are organized by similar properties into families (highly reactive metals, less reactive metals, highly reactive nonmetals, and some almost completely non-reactive gases).

Given a list of substances, recognize the basic components of the Periodic Table.

- A** misclassified the list of substances provided
- B** correctly classified the list of substances provided
- C** misclassified the list of substances provided
- D** misclassified the list of substances provided

- 12 (F2) P.PM.07.11:** Classify substances by their chemical properties (flammability, pH, and reactivity).

Recognize and explain how the same property of each substance is used to separate the substances provided as illustrated.

- A** correctly recognized and explained how the property was used to separate substances
- B** incorrectly explained how the substances were separated
- C** incorrectly explained how the substances were separated
- D** incorrectly explained how the substances were separated

- 12 (F3) P.PM.07.21:** Identify the smallest component that makes up an element.

Identify the smallest particle of an element.

- A** correctly identified the smallest component of an element
- B** selected a component that includes at least two of the smallest components from different elements
- C** selected a component that includes at least two of the smallest components for an element and most likely more than one element
- D** selected a concept that can include just the smallest particle of a single element to very many particles of more than one element

- 12 (F4) P.PM.07.22:** Describe how the elements within the Periodic Table are organized by similar properties into families (highly reactive metals, less reactive metals, highly reactive nonmetals, and some almost completely non-reactive gases).

Given a description of elements, recognize where the elements are presented in the Periodic Table.

- A** selected a location that incorrectly splits the element group across the Periodic Table
- B** identified correctly how the elements would be grouped in the Periodic Table
- C** selected a location that incorrectly splits the element group across the Periodic Table
- D** selected a location that incorrectly splits the element group across the Periodic Table

- 12 (F5) P.PM.07.11:** Classify substances by their chemical properties (flammability, pH, and reactivity).

Classify a substance by its chemical property described in the given experiment.

- A** incorrect, selected an unsupported characteristic
- B** incorrect, selected an unsupported characteristic
- C** correct, selected a characteristic supported by the given experiment
- D** incorrect, selected an unsupported characteristic

- 13 P.PM.07.23:** Illustrate the structure of molecules using models or drawings (water, carbon dioxide, table salt).

Identify the molecular diagram of a specified compound

- A** selected the correct molecular diagram
- B** selected an incorrect molecular diagram with insufficient number of atoms for the specified compound
- C** selected an incorrect molecular diagram with more than the number of atoms necessary for the specified compound
- D** selected an incorrect molecular diagram with more than the number of atoms necessary for the specified compound

- 14 P.CM.06.12:** Explain how mass is conserved as a substance changes from state to state in a closed system.

Given information regarding a lab exercise where a large amount of observed solid mass has become a small amount of observed solid mass due to a change in a closed system, select the best concept that explains how the total mass within the closed system remains the same before and after the change.

- A** selected an incorrect concept to explain how the mass remained constant
- B** selected an incorrect concept to explain how the mass remained constant
- C** selected an incorrect concept to explain how the mass remained constant
- D** selected the correct concept to explain how the total mass remained the same, though the solid mass decreased

- 15 (F1) P.EN.06.12:** Demonstrate the transformation between potential and kinetic energy in simple mechanical systems (for example: roller coasters, pendulums).

Identify which illustration displays the specified conversion of potential and kinetic energy.

- A** the correct illustration for the specified conversion of potential and kinetic energy
- B** illustration does not display an energy conversion
- C** illustration does not display an energy conversion
- D** illustration does not represent the specified energy source

- 15 (F2) P.EN.07.61:** Identify that nuclear reactions take place in the sun, producing heat and light.

Identify the type of reactions that occur within the Sun that produce heat and light.

- A** incorrect, selected a process in the water cycle caused by heat energy from the Sun
- B** incorrect, selected a biological process that uses light energy from the Sun
- C** incorrect, selected a type of reaction that is not performed within the Sun's core
- D** correct, selected the type of reactions that occur in the Sun

- 15 (F3) P.EN.06.41:** Explain how different forms of energy can be transferred from one place to another by radiation, conduction, or convection.

Given four different scientific observations, recognize which observation represents conduction.

- A** correct, selected the conduction observation example
- B** selected a convection observation example
- C** selected a convection observation example
- D** selected a radiation observation example

- 15 (F4) P.EN.06.41:** Explain how different forms of energy can be transferred from one place to another by radiation, conduction, or convection.

Recognize the type of energy transfer responsible for the object in the drawing to become heated.

- A** incorrect, described the transfer of energy in the form of electromagnetic waves
- B** correct, described the transfer of energy between molecules that are in direct contact with each other
- C** incorrect, described the transfer of energy through the movements of a liquid or gas
- D** incorrect, described how energy can change forms

- 15 (F5) P.EN.07.33:** Demonstrate how waves transfer energy when they interact with matter (for example: tuning fork in water, waves hitting a beach, earthquake knocking over buildings).

Identify the statement that indicates how a specified type of wave transfers energy.

- A** selected a true statement about the specified type of wave, which does not have any indication of energy transfer
- B** selected an untrue statement regarding how the specified type of wave transfers energy
- C** selected a true statement about the specified type of wave, which does not have any indication of energy transfer
- D** correctly selected the statement that would exemplify the effect of energy transfer by the specified type of wave

- 16 P.CM.07.22:** Compare and contrast the chemical properties of a new substance with the original after a chemical change.

Recognize similarities and differences between reactants and products after a chemical reaction.

- A** selected an incorrect statement about chemical properties of reactants and products
- B** recognized the difference in chemical properties of reactants and products
- C** selected an incorrect statement about the physical properties of reactants and products
- D** selected an incorrect statement about the elemental composition of the reactants and products

- 17 S.RS.07.12:** Describe limitations in personal and scientific knowledge.

Describe limitations that exist within the acquisition of scientific knowledge.

- A** correct, described valid data as a limiting factor when making conclusions
- B** incorrect, described a non-scientific process
- C** incorrect, described a process that could lead to developing scientific knowledge but is not necessary
- D** incorrect, selected an inaccurate description of a scientific process

- 18 S.IP.07.13:** Use tools and equipment (spring scales, stop watches, meter sticks and tapes, models, hand lens, thermometer, models, sieves, microscopes, hot plates, pH meters) appropriate to scientific investigations.

Choose the appropriate scientific tools to collect specified scientific data.

- A** selected one appropriate tool and one inappropriate tool for the specified scientific data collection
- B** selected one appropriate tool and one inappropriate tool for the specified scientific data collection
- C** correctly selected two appropriate tools for the specified scientific data collection task
- D** selected two inappropriate tools for the specified scientific data collection

- 19 E.SE.06.12:** Explain how waves, wind, water, and glacier movement, shape and reshape the land surface of the Earth by eroding rock in some areas and depositing sediments in other areas.

Recognize the relative time required for various Earth surface-shaping processes to change a specified Earth surface feature.

- A** selected a faster Earth-shaping process
- B** selected a faster Earth-shaping process
- C** correctly recognized the Earth-shaping process that requires the most time
- D** selected a faster Earth-shaping process

- 20 (F1) E.SE.06.53:** Describe layers of the Earth as a lithosphere (crust and upper mantle), convecting mantle, and dense metallic core.

Recognize the statement from the list provided that correctly describes one of Earth's layers.

- A** the description of the specified Earth layer is incorrect
- B** correctly recognized a described characteristic of the specified Earth layer
- C** the description of the specified Earth layer is incorrect
- D** the description of the specified Earth layer is incorrect

- 20 (F2) E.SE.06.11:** Explain how physical and chemical weathering lead to erosion and the formation of soils and sediments.

Recognize the similarity in both the physical and chemical breakdown of rock.

- A** selected a condition that is not necessary for the physical breakdown of rock
- B** selected a condition that is not true for the physical breakdown of rock
- C** correct, selected a common outcome from both the physical and chemical breakdown of rock
- D** selected a condition that is not true for the physical breakdown of rock

- 20 (F3) E.SE.06.41:** Compare and contrast the formation of rock types (igneous, metamorphic, and sedimentary) and demonstrate the similarities and differences using the rock cycle model.

Understand the rock formation cycle and rock formation processes.

- A** correctly recognized the type of rock found in a specified Earth-surface location
- B** incorrect, selected class of inorganic substances found in rock, not a type of rock
- C** incorrect, selected a specific compound, not a type of rock
- D** incorrectly selected a type of rock found in a specified Earth-surface location

- 20 (F4) E.SE.06.13:** Describe how soil is a mixture made up of weather eroded rock and decomposed organic material.

Recognize the source of soil components.

- A** selected an incorrect source for the specified soil component
- B** correctly recognized the source of a specified soil component
- C** selected an incorrect source for the specified soil component
- D** selected an incorrect source for the specified soil component

- 20 (F5) E.SE.06.61:** Describe the Earth as a magnet and compare the magnetic properties of the Earth to that of a natural or manufactured magnet.

Explain why Earth is considered a magnet.

- A** correct, described a magnetic characteristic of Earth
- B** incorrect, described a weather event that can have magnetic properties
- C** incorrect, selected an inaccurate description of Earth's composition
- D** incorrect, selected an inaccurate description of Earth's composition

- 21 E.SE.06.52:** Demonstrate how major geological events (earthquakes, volcanic eruptions, mountain building) result from these plate motions.

Describe the result of two lithospheric plates sliding past each other.

- A** correct, described a result at a transform fault when two tectonic plates slide past one another
- B** incorrect, described a result at a divergent plate boundary
- C** incorrect, described a result that would likely occur as a tectonic plate moves over a hotspot or at a subduction zone
- D** incorrect, described a result of two tectonic plates converging

- 22 (F1) E.SE.06.51:** Explain plate tectonic movement and how the lithospheric plates move centimeters each year.

Recognize the basis for tectonic plate movement.

- A** selected an incorrect basis for tectonic plate movement
- B** correctly selected the basis for tectonic plate movement
- C** selected an incorrect basis for tectonic plate movement
- D** selected an incorrect basis for tectonic plate movement

- 22 (F2) E.SE.06.13:** Describe how soil is a mixture made up of weather eroded rock and decomposed organic material.

Recognize that soil is a mixture of minerals, organic material, air, and water.

- A** selected correct display of soil components
- B** selected incorrect display of soil components
- C** selected incorrect display of soil components
- D** selected incorrect display of soil components

- 22 (F3) E.SE.06.53:** Describe layers of the Earth as a lithosphere (crust and upper mantle), convecting mantle, and dense metallic core.

Recognize the components and features of Earth's layers.

- A** selected the accurate description of the components and features of Earth's layers
- B** selected an incorrect description of the components and features of Earth's layers
- C** selected an incorrect description of the components and features of Earth's layers
- D** selected an incorrect description of the components and features of Earth's layers

- 22 (F4) E.SE.06.11:** Explain how physical and chemical weathering lead to erosion and the formation of soils and sediments.

Identify an example of chemical weathering.

- A** incorrect, described a process of physical movement of soil
- B** incorrect, described a process of physical weathering
- C** correct, described a process of chemical weathering
- D** incorrect, described a process of physical weathering

- 22 (F5) E.SE.06.41:** Compare and contrast the formation of rock types (igneous, metamorphic, and sedimentary) and demonstrate the similarities and differences using the rock cycle model.

Recognize the processes for formation of specific types of rock.

- A** the rock formation process is paired with incorrect type of rock
- B** the rock formation process is paired with incorrect type of rock
- C** the rock formation process is paired with incorrect type of rock
- D** correctly recognized the type of rock produced by the formation process

- 23 E.ES.05.61:** Demonstrate and explain seasons using a model.

Recognize the reason why Michigan's average daily temperatures differ between two specified seasons of the year.

- A** correct, selected the reason for the difference in temperature between the two seasons
- B** selected a reason that is unrelated to a source of Earth's heat
- C** selected a reason that does not consider Earth's position in orbit
- D** selected a reason that is unrelated to a source of Earth's heat

- 24 E.ES.07.13:** Describe how the warming of the Earth by the sun produces winds and ocean currents.

Recognize the effects of ocean currents on adjacent land climate conditions.

- A** selected an incorrect explanation for the climate difference
- B** selected an incorrect explanation for the climate difference
- C** selected an incorrect explanation for the climate difference
- D** correctly recognized how the specified ocean current effects adjacent land climate

- 25 (F1) E.ES.07.73:** Explain how the temperature of the oceans affects the different climates on Earth because water in the oceans holds a large amount of heat.

Identify an ocean feature that has a primary role in determining climates on Earth.

- A** incorrect, described a feature that plays a minimal role in Earth's climates
- B** incorrect, described a feature that may play a role only in coastal ecosystems
- C** correct, described the influence of water's high specific heat
- D** incorrect, described a feature that may play a role only in marine ecosystems

- 25 (F2) E.ES.07.74:** Describe weather conditions associated with frontal boundaries (cold, warm, stationary, and occluded) and the movement of major air masses and the jet stream across North America using a weather map.

Using a conventional weather map, identify the type of front depicted on the map.

- A** selected a type of front that is not depicted on the map
- B** selected a name for a front that is not recognized in meteorology
- C** selected a type of front that is not depicted on the map
- D** correctly recognized the front depicted on the map

- 25 (F3) E.ES.05.62:** Explain how the revolution of the Earth around the sun defines a year.

Recognize how the Earth moves in relation to units of time.

- A** incorrectly associated Earth movement with units of time
- B** incorrectly associated Earth movement with units of time
- C** correctly associated Earth movement with units of time
- D** incorrectly associated Earth movement with units of time

- 25 (F4) E.ES.07.41:** Explain how human activities (surface mining, deforestation, overpopulation, construction and urban development, farming, dams, landfills, and restoring natural areas) change the surface of the Earth and affect the survival of organisms.

Understand availability of a groundwater resource in respect to groundwater use.

- A** correctly recognized the effects on the groundwater resource based on specified use of the water resource
- B** incorrectly selected an effect on the groundwater resource based on specified use of the water resource
- C** incorrectly selected an effect on the groundwater resource based on specified use of the water resource
- D** incorrectly selected an effect on the groundwater resource based on specified use of the water resource

- 25 (F5) E.ES.07.72:** Describe how different weather occurs due to the constant motion of the atmosphere from the energy of the sun reaching the surface of the Earth.

Identify how the Sun's energy generates various weather conditions on Earth

- A** selected an incorrect concept regarding how the Sun's energy affects weather
- B** selected the correct concept regarding how the Sun's energy affects weather
- C** selected an incorrect concept regarding how the Sun's energy affects weather
- D** selected an incorrect concept regarding how the Sun's energy affects weather

- 26 S.RS.07.19:** Describe how science and technology have advanced because of the contributions of many people throughout history and across cultures.

Recognize the process of development and change in scientific theory as research proceeds across time.

- A** correctly recognized how scientific investigations across time can develop improved theory
- B** incorrectly selected a concept that science can ignore prior work on a select topic
- C** incorrectly selected a concept that science can ignore prior work on a select topic
- D** incorrectly select the illogical concept that scientific theory must be proved before science advances

- 27 S.IP.07.16:** Identify patterns in data.

Use evidence to draw a conclusion.

- A** recognized the correct conclusion based on the evidence provided
- B** selected a conclusion that contradicts the evidence provided
- C** selected a conclusion that is neither supported or denied by the evidence provided
- D** selected a conclusion that is neither supported or denied by the evidence provided

- 28 S.IP.07.15:** Construct charts and graphs from data and observations.

Recognize a graph that accurately presents data from an investigation.

- A** correct, selected the graph accurately displaying the investigation data
- B** incorrect, selected a graph not reflecting the investigation data
- C** incorrect, selected a graph not reflecting the investigation data
- D** incorrect, selected a graph not reflecting the investigation data

- 29 S.IA.07.13:** Communicate and defend findings of observations and investigations.

Use data from tables and graphs to obtain information.

- A** selected an information statement that is not substantiated by the data in the graph
- B** selected an information statement that is not substantiated by the data in the graph
- C** selected correct information from a graph regarding a trend
- D** selected a statement of information that is not substantiated by the data in the graph

- 30 (F1) S.RS.07.17:** Describe the effect humans and other organisms have on the balance of the natural world.

Describe how humans can negatively affect the environment.

- A** correct, described an action that can have adverse effects on the environment
- B** incorrect, described a positive action in response to a likely negative action on the environment
- C** incorrect, described an action resulting in reduced waste sent to landfills
- D** incorrect, described an action that would have a positive impact on local water quality

- 30 (F2) S.RS.07.15:** Demonstrate scientific concepts through various illustrations, performances, models, exhibits, and activities.

Select a demonstration model for rock formation that adequately corresponds to the natural formation of a type of rock in the rock cycle.

- A** Recognized an adequate demonstration model for a type of rock in the rock formation cycle
- B** selected a model where model materials and process do not represent formation of a specific type of rock-cycle rock
- C** selected a model where model materials and process do not represent formation of a specific type of rock-cycle rock
- D** selected a model where model materials and process do not represent formation of a specific type of rock-cycle rock

- 30 (F3) S.RS.07.13:** Identify the need for evidence in making scientific decisions.

Recognize how to check the reliability of an outcome from a specified scientific investigation.

- A** incorrect, selected an action that does not address reliability
- B** incorrect, selected an action that does not address reliability
- C** correct, selected an action that can help check the reliability of an investigation
- D** incorrect, selected an action that would increase the number of variables being tested

- 30 (F4) S.RS.07.13:** Identify the need for evidence in making scientific decisions.

Identify that evidence is needed for scientific information to be valid.

- A** incorrect, described personal dispositions
- B** incorrect, described ideas not based on facts
- C** correct, described data that can be used to validate scientific information
- D** incorrect, described a possible result after scientific information is validated

- 30 (F5) S.RS.07.11:** Evaluate the strengths and weaknesses of claims, arguments, and data.

Accurately interpret data as basis for preparation of an evaluative conclusion.

- A** prepared an inaccurate evaluative conclusion based on the data provided
- B** prepared an inaccurate evaluative conclusion based on the data provided
- C** prepared an inaccurate evaluative conclusion based on the data provided
- D** correct, prepared an accurate evaluative conclusion based on the data provided

- 31 E.ES.07.71:** Compare and contrast the difference and relationship between climate and weather.

Understand the differences between weather and climate.

- A** correctly selected a distinction between climate and weather
- B** selected a correct concept about weather but an incorrect concept about climate
- C** selected a correct statement about how climate influences weather but an incorrect statement about how weather influences climate
- D** selected a correct statement about the display of weather information but an incorrect statement about the display of climate information

- 32 E.FE.07.11:** Describe the atmosphere as a mixture of gases.

Recognize that Earth's atmosphere is a mixture of gases.

- A** correctly described the atmosphere and identified its basic composition
- B** incorrectly identified its basic composition
- C** incorrectly described the atmosphere and correctly identified its basic composition
- D** incorrectly described the atmosphere and its basic composition

- 33 (F1) E.ES.07.82:** Analyze the flow of water between the components of a watershed, including surface features (lakes, streams, rivers, wetlands) and groundwater.

Use knowledge of water flow and a provided map to determine the location of material transported by the water flow system.

- A** used the information provided to identify the correct map location
- B** selected a location for the material that is contrary to the water flow
- C** selected a location for the material that is contrary to the water flow
- D** selected a location for the material that is contrary to the water flow

- 33 (F2) E.ES.07.12:** Describe the relationship between the warming of the atmosphere of the Earth by the sun and convection within the atmosphere and oceans.

Recognize the process of convection and its features as it occurs in Earth's atmosphere.

- A** selected an ambiguous or incomplete statement about air movement
- B** selected an ambiguous or incomplete statement about warming of Earth's surface
- C** recognized the statement that correctly describes atmosphere movement due to convection
- D** selected a statement that addresses the hydrosphere

- 33 (F3) E.ES.07.11:** Demonstrate, using a model or drawing, the relationship between the warming by the sun of the Earth and the water cycle as it applies to the atmosphere (evaporation, water vapor, warm air rising, cooling, condensation, clouds).

Given a water cycle model, identify and describe how the primary source of energy drives the water cycle.

- A** selected incorrect source of energy but correctly described the process shown in the model
- B** correct, describes the Sun's role in the water cycle during the process of evaporation
- C** selected incorrect source of energy for the process shown in the model
- D** selected incorrect source of energy and description of process shown in the model

- 33 (F4) E.ES.07.72:** Describe how different weather occurs due to the constant motion of the atmosphere from the energy of the sun reaching the surface of the Earth.

Understand regional weather and climate differences in relation to incident energy from the Sun onto Earth.

- A** correctly recognized Earth regional weather and climate consequences due to Sun's incident energy onto Earth.
- B** selected an incorrect conclusion about the Sun's incident energy as it relates to weather and climate conditions in a specified region on Earth
- C** selected an incorrect conclusion about the Sun's incident energy as it relates to temperature in a specified region on Earth
- D** selected an incorrect conclusion about the Sun's incident energy as it relates to temperature in a specified region on Earth

- 33 (F5) E.ES.07.81:** Explain the water cycle and describe how evaporation, transpiration, condensation, cloud formation, precipitation, infiltration, surface runoff, ground water, and absorption occur within the cycle.

Recognize the various descriptions and relationships among water resources in the water cycle.

- A** misidentified the specified water resource
- B** misidentified the specified water resource
- C** misidentified the specified water resource
- D** correctly recognized the specified water resource

- 34 E.ST.05.23:** Explain the apparent motion of the stars (constellations) and the Sun across the sky.

Understand the apparent motion of constellations as viewed from Earth over time.

- A** correctly recognized the basis for the apparent motion of constellations when viewed from Earth
- B** selected an incorrect basis for the apparent motion
- C** selected an incorrect basis for the apparent motion
- D** selected an incorrect basis for the apparent motion

- 35 (F1) E.ST.06.42:** Describe how fossils provide important evidence of how life and environmental conditions have changed.

Draw the most appropriate conclusion based on specified fossil evidence.

- A** selected a conclusion that relied on incorrect glacier movement
- B** correctly selected the appropriate conclusion based on the available fossil evidence
- C** selected a conclusion that could not account for the many fossils of this type distributed across Michigan
- D** selected a conclusion that is incorrect and not attributable to the specified fossil evidence

- 35 (F2) E.ST.06.31:** Explain how rocks and fossils are used to understand the age and geological history of the Earth (timelines and relative dating, rock layers).

Understand how rock layers enable scientist to determine the age of organisms

- A** correctly explained which rock layer and fossils were older
- B** selected an incorrect sequence of time for formation of two rock layers
- C** selected an incorrect sequence of time for formation of the five rock layers
- D** selected a evolutionary incorrect reason to age the fossils found in a specific rock layer

- 35 (F3) E.ST.05.21:** Describe the motion of planets and moons in terms of rotation on axis and orbits due to gravity.

Understand how the motions of Earth are related to units of time.

- A** selected a statement that incorrectly relates Earth's motion to units of time
- B** selected a statement that accurately relates Earth's motion to units of time
- C** selected a statement that incorrectly relates Earth's motion to units of time
- D** selected a statement that incorrectly relates Earth's motion to units of time

- 35 (F4) E.ST.05.24:** Explain lunar and solar eclipses.

Distinguish and explain difference between a lunar and solar eclipse.

- A** correctly recognized and explained a solar eclipse
- B** mistakenly selected a lunar eclipse
- C** selected a solar eclipse with an incorrect explanation
- D** mistakenly selected a lunar eclipse

- 35 (F5) E.ST.05.25:** Explain the tides of the oceans as they relate to the gravitational pull and orbit of the moon.

Among a list of four statements, recognize the statement that explains tidal movement.

- A** selected a statement that incorrectly attributes tidal movement to an atmospheric force
- B** selected a statement that incorrectly attributes tidal movement to rapid changes in Earth's surface
- C** selected a statement that incorrectly attributes tidal movement to temperature variation
- D** selected a statement that correctly recognizes that tidal movement is caused by gravitational force outside of Earth's

- 36 E.ST.05.22:** Explain the phases of the moon.

Recognize the basis for how moon appears on Earth as it proceeds through the lunar cycle.

- A** selected an incorrect basis for the change in the moon's appearance through the lunar cycle
- B** selected an incorrect basis for the change in the moon's appearance through the lunar cycle
- C** selected an incorrect basis for the change in the moon's appearance through the lunar cycle
- D** recognized the basis for the moon's appearance through the lunar cycle

- 37 (F1) E.ST.06.41:** Explain how Earth processes (erosion, mountain building, and glacier movement) are used for the measurement of geologic time through observing rock layers.

Recognize the geological evidence that scientists obtain from the study of rock layers.

- A** selected specific results not supported by the scientific use of rock-layer evidence
- B** selected a technological use that is not a scientific use of rock-layer evidence
- C** selected scientific data that is not provided by rock-layer evidence
- D** correctly recognized the scientific data provided by rock-layer evidence

- 37 (F2) E.ST.05.11:** Design a model of the solar system that shows the relative order and scale of the planets, dwarf planets, comets, and asteroids to the sun.

Understand how a specific component of the solar system moves within the solar system.

- A** correctly recognized how the specified component moves in the solar system
- B** selected an incorrect description for the movement of the specified component in the solar system
- C** selected an incorrect description for the movement of the specified component in the solar system
- D** selected an incorrect description for the movement of the specified component in the solar system

- 37 (F3) E.ST.05.21:** Describe the motion of planets and moons in terms of rotation on axis and orbits due to gravity.

Recognize the features which distinguish planets from stars.

- A** selected a feature of a star, not a planet
- B** selected a feature of a star, not a planet
- C** correct, selected the feature which would distinguish a planet, not a star
- D** selected a feature that does not distinguish a star from a planet

- 37 (F4) E.ST.06.42:** Describe how fossils provide important evidence of how life and environmental conditions have changed.

Among a list of four factual statements, recognize the statement of fact that best supports the conclusion that Michigan's environment has changed over time.

- A** correct, selected the factual statement about Michigan's past environment
- B** selected a factual statement about an environmental impact that does not apply to Michigan
- C** selected a factual statement about early Michigan anthropology that does not provide evidence of an environmental change
- D** selected a factual statement about early Michigan anthropology that does not provide evidence of an environmental change

- 37 (F5) E.ST.05.21:** Describe the motion of planets and moons in terms of rotation on axis and orbits due to gravity.

Identify the celestial activity the Earth needs a specified amount of time to complete.

- A** the Earth does not carry out this celestial activity
- B** correctly identified the celestial activity that the Earth completes in the specified time
- C** the Earth needs less than the specified time to carry out this celestial activity
- D** the Earth does not carry out this celestial activity

- 38 (F1) S.IA.07.15:** Use multiple sources of information to evaluate strengths and weaknesses of claims, arguments, or data.

From a list of options, recognize the best way to gather information about a scientific prediction.

- A** selected an insufficient method to gather information about the prediction
- B** selected the most sufficient plan by which to gather information about the prediction
- C** selected an insufficient method to gather information about the prediction
- D** selected an insufficient method to gather information about the prediction

- 38 (F2) S.IA.07.11:** Analyze information from data tables and graphs to answer scientific questions.

Using the graph provided, identify the environmental conditions that maximize opportunity for a specified environmental change.

- A** selected a set of environmental conditions that does not maximize the environmental change
- B** selected a set of environmental conditions that does not maximize the environmental change
- C** selected a set of environmental conditions that does not maximize the environmental change
- D** selected the set of environmental conditions that will maximize the environmental change

- 38 (F3) S.IA.07.15:** Use multiple sources of information to evaluate strengths and weaknesses of claims, arguments, or data.

Given a technical, mechanical, and electrical project, identify key words about the project to search and obtain information to complete the project.

- A** selected key words that did not address the project's objective
- B** selected key words that did not address the project's objective
- C** recognized the most appropriate keywords to use to obtain relevant and helpful information about the project
- D** selected key words that did not address the project's objective

- 38 (F4) S.IA.07.11:** Analyze information from data tables and graphs to answer scientific questions.

Given three graphs that illustrate the percentage and type of surface water within total fresh water and the percent of fresh water within Earth's total water, recognize the statement that is correct based on the information presented in the graphs.

- A** selected a statement of fact using information not provided by the graphs
- B** selected a statement that over represents the percentage of a water type in a location with respect to all Earth's water
- C** selected a statement that misinterprets the information provided in one of the graphs
- D** selected the correct statement that characterizes the state of matter of Earth's surface water

- 38 (F5) S.IA.07.15:** Use multiple sources of information to evaluate strengths and weaknesses of claims, arguments, or data.

Given a specific scientific task, review a list of four information references about the task to recognize the most helpful reference.

- A** selected a reference that is a source of information used to sell the product being studied, a potentially biased, non-impartial reference
- B** selected as a reference an article about the material being studied that does not provide information about the task's objective
- C** correct, selected as a reference objective scientific information about the material being studied from a credible, impartial source
- D** selected as a reference opinions from a non-scientific survey about an off-topic feature of the material being studied

- 39 P.FM.05.21:** Distinguish between contact forces and non-contact forces.

Given seven events of force on an object arranged into four separate pairs of events, recognize the pair that exhibits force from a contact and a noncontact force.

- A** selected a pair where both exhibit noncontact force
- B** correct, selected the pair that includes a contact and a noncontact force
- C** selected a pair where both exhibit contact force
- D** selected a pair where both exhibit contact force

- 40 (F1) P.FM.05.43:** Illustrate how motion can be measured and represented on a graph.

Identify a written description of motion for an object that best matches a speed versus time graph.

- A** incorrectly described some of the changes in speed
- B** incorrectly described all of the changes in speed
- C** correctly described the changes in speed
- D** incorrectly described some of the changes in speed

- 40 (F2) P.FM.05.34:** Relate the size of change in motion to the strength of unbalanced forces and the mass of the object.

Use the features of a diagram (provided) of an object in motion to recognize the object's change in velocity.

- A** correctly recognized object's change direction but incorrectly selected the object's change in speed
- B** correctly recognized object's change direction but incorrectly selected the object's change in speed
- C** correctly recognized object's change in direction and change in speed
- D** incorrectly recognized object's change in direction and change in speed

- 40 (F3) P.FM.05.31:** Describe what happens when two forces act on an object in the same or opposing directions.

Describe the force(s) acting on an specified object.

- A** incorrectly described the force(s)
- B** incorrectly described the force(s)
- C** incorrectly described the force(s)
- D** correctly described the forces acting on the object based on its movement

- 40 (F4) P.FM.05.32:** Describe how constant motion is the result of balanced (zero net) forces.

Understand how the constant speed of an object relates to the forces acting on the object.

- A** selected a statement that does not enable the object to remain at a constant speed
- B** selected a statement that is not necessarily true regarding the object's speed
- C** selected a statement that does not enable the object to remain at a constant speed
- D** selected the correct statement that describes the relationship between forces acting on an object moving at a constant speed

- 40 (F5) P.FM.05.42:** Describe the motion of an object in terms of distance, time and direction, as the object moves, and in relationship to other objects.

Given a scenario of two objects in motion at set speeds and directions from a specified starting point as illustrated, recognize the best factual statement regarding the objects' locations after a specified amount of time.

- A** selected a statement in which the relative locations and speeds of the objects are incorrect
- B** selected the correct statement regarding the relative locations and speeds of the objects
- C** selected a statement in which the relative locations are correct, however the relative speeds of the objects are incorrect
- D** selected a statement in which the relative locations are incorrect, however the relative speeds of the objects are correct

- 41 P.FM.05.41:** Explain the motion of an object relative to its point of reference.

Given an illustration of an object in motion, recognize the change in motion in relation to the points of reference provided in the illustration.

- A** selects an incorrect interpretation of the object's motion at a specified point of reference
- B** correctly recognized the change of the objects motion at the specified point of reference
- C** selects an incorrect interpretation of the object's motion at a specified point of reference
- D** selects an incorrect interpretation of the object's motion at a specified point of reference

- 42 P.EN.07.31:** Identify examples of waves, including sound waves, seismic waves, and waves on water.

Given a wave diagram with some information, identify, from a list, the information about the wave not provided.

- A** selected information provided in the wave diagram
- B** selected information provided in the wave diagram
- C** correctly recognized the type of information not provided in the diagram
- D** selected information provided in the wave diagram

- 43 (F1) P.EN.07.33:** Demonstrate how waves transfer energy when they interact with matter (for example: tuning fork in water, waves hitting a beach, earthquake knocking over buildings).

Understand how a specified type of wave can transfer energy to other matter.

- A** selected an incorrect description how the specified wave energy transfer interacts with the other matter
- B** selected the correct visual description of how the wave transfers energy to the other matter
- C** selected an incorrect description how the specified wave energy transfer interacts with the other matter
- D** selected an incorrect description how the specified wave energy transfer interacts with the other matter

- 43 (F2) P.EN.06.11:** Identify kinetic or potential energy in everyday situations (for example: stretched rubber band, objects in motion, ball on a hill, food energy).

Compare four actions and determine which action has the most potential energy.

- A** incorrect, described an action that has the highest kinetic energy and a low potential energy
- B** incorrect, described an action that has kinetic energy and decreasing potential energy
- C** correct, described an action providing the most potential energy
- D** incorrect, described an action that has no kinetic energy and the lowest amount of potential energy

- 43 (F3) P.EN.07.62:** Explain how only a tiny fraction of light energy from the Sun is transformed to heat energy on Earth.

Understand the amount of the Sun's light transformation to heat on Earth

- A** recognized the correct estimate of the proportion of the Sun's light transformation to heat on Earth
- B** selected an incorrect estimate of the proportion of the Sun's light transformation to heat on Earth
- C** selected an incorrect estimate of the proportion of the Sun's light transformation to heat on Earth
- D** selected an incorrect estimate of the proportion of the Sun's light transformation to heat on Earth

- 43 (F4) P.EN.07.62:** Explain how only a tiny fraction of light energy from the Sun is transformed to heat energy on Earth.

Recognize the relative amount of transformation of a specified energy from the Sun to a specified energy on Earth.

- A** correctly identifies the relative amount of energy transformation
- B** overestimates the relative amount of energy transformation
- C** overestimates the relative amount of energy transformation
- D** overestimates the relative amount of energy transformation

- 43 (F5) P.EN.06.12:** Demonstrate the transformation between potential and kinetic energy in simple mechanical systems (for example: roller coasters, pendulums).

Given an illustration of a marble moving on the surface of an upright curved track, recognize the statement that best describes the energy of the moving marble at labeled distinct points along the curved track.

- A** selected a statement that does not appropriately identify the marble's type of energy at specified points on the track
- B** selected a statement that does not appropriately quantify the marble's type of energy at specified points on the track
- C** correctly selected the statement that appropriately identifies the marble's types of energy at specified points on the track
- D** selected a statement that does not appropriately quantify the marble's type of energy at specified points on the track

- 44 P.EN.07.32:** Describe how waves are produced by vibrations in matter.

Understand that sound waves transmit through a substance medium, either gas, liquid, or solid.

- A** did not select the medium through which sound waves travel the fastest
- B** did not select the medium through which sound waves travel the fastest
- C** correct, recognized the medium through which sound waves travel the fastest
- D** did not select the medium through which sound waves travel the fastest

- 45 (F1) P.CM.07.23:** Describe the physical properties and chemical properties of the products and reactants in a chemical change.

Distinguish chemical and physical change processes that occur in the human body.

- A** recognized the chemical change that occurs within the human body
- B** did not recognize the chemical change
- C** did not recognize the chemical change
- D** did not recognize the chemical change

- 45 (F2) P.CM.06.11:** Describe and illustrate changes in state, in terms of the arrangement and relative motion of the atoms or molecules.

Understand the movement features of mass across various changes in the state of matter.

- A** correctly identified the state of matter in which the molecules of that matter have greatest movement
- B** selected a state of matter where molecules of the matter do not have the greatest freedom of movement
- C** selected a condition where the mass consists of at least two different molecule types which can occur in any state of matter
- D** selected a state of matter where molecules of the matter do not have the greatest freedom of movement

- 45 (F3) P.CM.07.21:** Identify evidence of chemical change through color, gas formation, solid formation, and temperature change.

Identify the best evidence of a chemical change.

- A** incorrect, described a shared characteristic of physical changes and chemical changes
- B** correct, described a chemical change which produces a new substance
- C** incorrect, described a shared characteristic of physical changes and chemical changes
- D** incorrect, described a characteristic of a physical change

- 45 (F4) P.CM.07.23:** Describe the physical properties and chemical properties of the products and reactants in a chemical change.

Recognize indicators of a chemical change.

- A** correctly selected a comparison between reactants and products which indicates that a chemical change occurred
- B** selected a comparison between reactants and products which does not indicate that a chemical change occurred
- C** selected the concept that no chemical change occurred
- D** selected the concept that no chemical change occurred

- 45 (F5) P.CM.06.12:** Explain how mass is conserved as a substance changes from state to state in a closed system.

Given an illustrated observation on mass changing its state of matter, recognize how mass is conserved.

- A** selected the correct statement about conservation of mass
- B** selected an incorrect statement about conservation of mass in reference to the illustration provided
- C** selected an incorrect statement about conservation of mass in reference to the illustration provided
- D** selected an incorrect statement about conservation of mass in reference to the illustration provided

- 46 S.IA.07.14:** Draw conclusions from sets of data from multiple trials of a scientific investigation to draw conclusions.

Given a table of measurement data from the described investigation, recognize the conclusion best supported by the pattern in the provided data.

- A** selected an illogical conclusion regarding the data
- B** selected an incorrect conclusion about a trend in the data
- C** selected an incorrect conclusion about a trend in the data
- D** selected the conclusion supported by the data provided in the table

- 47 S.RS.07.16:** Design solutions to problems using technology.

Analyze a complex problem and apply knowledge from one area to formulate a solution using technology.

- A** incorrect, described a technology that does not provide a solution
- B** incorrect, described a technology that would help identify a problem but not provide a solution
- C** incorrect, described a technology that provides an incomplete solution to the problem
- D** correct, described a complete solution using technology

- 48 L.EV.05.11:** Explain how behavioral characteristics (adaptation, instinct, learning, habit) of animals help them to survive in their environment.

Explain how a certain behavior helps an organism survive in its environment.

- A** incorrect, selected a likely explanation for a different behavior
- B** incorrect, selected a unlikely explanation for the given behavior
- C** incorrect, selected a unlikely explanation for the given behavior
- D** correct, selected a likely explanation for the given behavior

- 49 (F1) L.OL.06.51:** Classify producers, consumers, and decomposers based on their source of food (the source of energy and building materials).

Explain which organisms would best complete a diagram showing a path of energy.

- A** selected incorrect label to complete diagram and incorrect explanation
- B** selected incorrect label to complete diagram and incorrect explanation
- C** incorrect; selected correct label based on food source but incorrect explanation for the diagram
- D** correct, described an accurate label based on food source and provides a correct explanation

- 49 (F2) L.OL.07.21:** Recognize that all organisms are composed of cells (single cell organisms, multicellular organisms).

Recognize evidence that indicates life form.

- A** selected evidence of substance used for life, but not necessarily indicative of a life form
- B** selected evidence of substance used for life, but not necessarily indicative of a life form
- C** identified evidence of present or previous life form
- D** selected evidence that is not indicative of present or previous life form

- 49 (F3) L.OL.07.22:** Explain how cells make up different body tissues, organs, and organ systems.

Describe how tissues are dependent on the grouping of similar cells.

- A** incorrect, described similar macromolecules
- B** incorrect, described similar parts of cells
- C** correct, described a characteristic of cells in a tissue
- D** incorrect, described similar macromolecules

- 49 (F4) L.OL.07.61:** Recognize the need for light to provide energy for the production of carbohydrates, proteins and fats.

Recognize plants need light energy in order to produce substances necessary for life.

- A** incorrect, described an energy not used to produce substances necessary for life
- B** correct, described the type of energy used to produce substances necessary for life
- C** incorrect, described an energy not used to produce substances necessary for life
- D** incorrect, described an energy not used to produce substances necessary for life

- 49 (F5) L.OL.07.23:** Describe how cells in all multicellular organisms are specialized to take in nutrients, which they use to provide energy for the work that cells do and to make the materials that a cell or organism needs.

Recognize the digestion process for a multicellular organism.

- A** selected the correct multicellular organ and its function so as to distribute food energy to cell
- B** selected the correct multicellular organ and its function but incorrectly limited distribution of food energy to cell
- C** selected, in error, the food processing function and food energy storage organ
- D** selected, in error, the food processing function though identified the food energy absorption process

- 50 L.HE.07.22:** Compare and contrast the advantages and disadvantages of sexual vs. asexual reproduction.

Identify an advantage of asexual reproduction.

- A** selected an incorrect statement about asexual reproduction
- B** correct, selected an advantage of asexual reproduction
- C** incorrect, selected an advantage of sexual reproduction
- D** incorrect, selected an advantage that is more likely for a species that utilizes sexual reproduction

- 51 L.EC.06.11:** Identify and describe examples of populations, communities, and ecosystems including the Great Lakes region.

Recognize a Great Lakes ecosystem.

- A** incorrect, described an ecosystem that is often located in southwest region of the United States
- B** incorrect, described a northern treeless ecosystem
- C** incorrect, described an ecosystem located in ocean coastal areas
- D** correct, described a Great Lakes ecosystem

- 52 (F1) L.EC.06.31:** Identify the living (biotic) and nonliving (abiotic) components of an ecosystem.

Identify the ecosystem factor status of two specified components of a specified Michigan ecosystem.

- A** correctly classified one factor, however incorrectly classified the other factor
- B** correctly classified one factor, however incorrectly classified the other factor
- C** correctly recognized the factor status of the two specified components
- D** incorrectly classified both factors

- 52 (F2) L.EC.06.41:** Describe how human beings are part of the ecosystem of the Earth and that human activity can purposefully, or accidentally, alter the balance in ecosystems.

Using the information provided, select the best statement about the effect of human activity on a specified land area.

- A** selected a statement that is not substantiated by the information provided
- B** selected the statement that is substantiated by the information provided
- C** selected a statement that is not substantiated by the information provided
- D** selected a statement that is not substantiated by the information provided

- 52 (F3) L.EC.06.41:** Describe how human beings are part of the ecosystem of the Earth and that human activity can purposefully, or accidentally, alter the balance in ecosystems.

Given a list of four facts about an ecosystem, identify the fact that exemplifies a human contribution to ecosystem change.

- A** selected a fact about ecosystem change that does not involve human activity
- B** selected a fact about ecosystem change that does not involve human activity
- C** recognized that human activity will impact the effect that animals will have on the otherwise prevailing ecosystem
- D** selected a fact about ecosystem change that does not involve human activity

- 52 (F4) L.EC.06.42:** Predict possible consequences of overpopulation of organisms, including humans, (for example: species extinction, resource depletion, climate change, pollution).

From the list of consequences, recognize the most serious consequence that could follow the introduction of a specified non-native species into a described ecosystem.

- A** selected a negative consequence for the non-native species that will not impact the ecosystem
- B** correctly selected the consequence where the non-native species disrupts the population levels of native ecosystem populations
- C** selected a negative consequence for the non-native species that will not impact the ecosystem
- D** selected a negative consequence for the non-native species that will not impact the ecosystem

- 52 (F5) L.EC.06.22:** Explain how two populations of organisms can be mutually beneficial and how that can lead to interdependency.

Based on the description provided, recognize the type of relationship between the two organisms.

- A** recognized the correct type of relationship between the two organisms
- B** selected an incorrect type of relationship between the two organisms
- C** selected an incorrect type of relationship between the two organisms
- D** selected an incorrect type of relationship between the two organisms

- 53 L.EC.06.23:** Predict how changes in one population might affect other populations based upon their relationships in the food web.

Using the food-web information provided, recognize the expected changes in other organism populations in an ecosystem after a change occurred in another specified ecosystem population.

- A** correct, recognized the expected populations' change levels after the change in the specified population level
- B** selected populations' change levels not expected to occur after the change in the specified population level
- C** selected populations' change levels not expected to occur after the change in the specified population level
- D** selected populations' change levels not expected to occur after the change in the specified population level

5th

8th



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